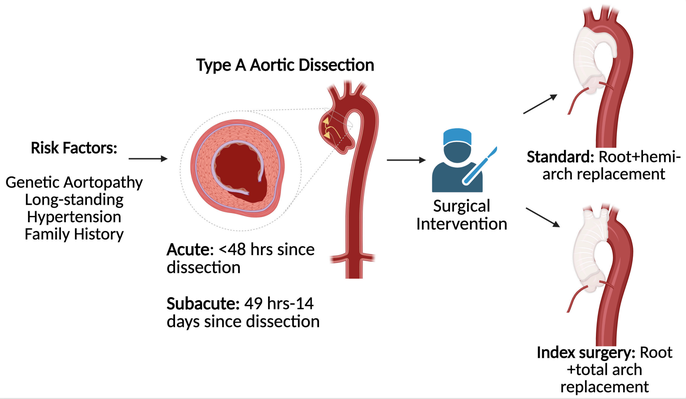
Perioperative Outcomes of Concomitant Aortic Root and Arch Surgery in Acute and Subacute Type A Aortic Dissection

Aedian O'Connor[1], Scott DeRoo[1,2], Bret DeGraaff[2], Arjune Dhanekula[2], Catherine Eccleston[2], Rachel Flodin[2]
[1]University of Washington School of Medicine, [2]Division of Cardiothoracic Surgery, University of Washington

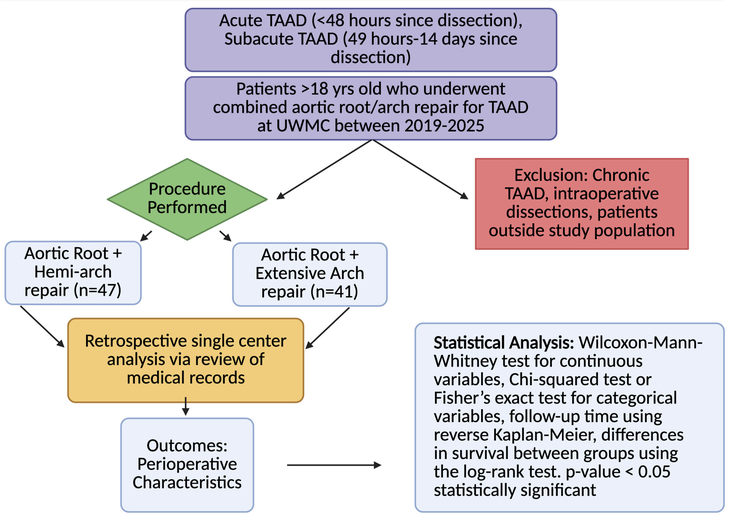
BACKGROUND



OBJECTIVE

We speculate that concomitant root and extensive arch replacement in type A aortic dissection does not result in increased perioperative morbidity/mortality at a tertiary academic medical center in select patients.

METHODS



RESULTS

Characteristic	Root/Hemi (n = 47)	Root/Arch (n = 41)	Overall (n = 88)	p-value	N
Cerebral Perfusion				<0.001	88
ACP/RCP	21 (44.68%)	40 (97.56%)	61 (69.32%)		
Retrograde Cerebral Perfusion only	26 (55.32%)	1 (2.44%)	27 (30.68%)		
Cross Clamp Time	166.00 (149.00,188.00)	210.00 (185.00,255.00)	185.50 (157.50,223.00)	<0.001	88
Cardiopulmonary Bypass Time	221.00 (201.00,260.00)	261.00 (227.00,314.00)	242.00 (206.50,292.00)	0.002	88
Deep Hypothermic Cardiac Arrest Time	23.00 (20.00,30.00)	42.00 (34.00,51.00)	30.50 (22.00,42.00)	<0.001	86

Table 1: Operative characteristics between combined root/hemiarch cohort (Root/Hemi) vs. root/extensive arch cohort (Root/Arch). ACP/RCP-Antegrade and Retrograde Cerebral Perfusion

Characteristic	Root/Hemi (n = 47)	Root/Arch (n = 41)	Overall (n = 88)	p-value	N
Permanent CVA	12 (25.53%)	8 (19.51%)	20 (22.73%)	0.50	88
Prolonged Vent	16 (34.04%)	11 (26.83%)	27 (30.68%)	0.46	88
Tracheostomy	8 (17.02%)	1 (2.44%)	9 (10.23%)	0.033	88
New Dialysis				0.060	88
None	41 (87.23%)	41 (100.00%)	82 (93.18%)		
Temporary	4 (8.51%)	0 (0.00%)	4 (4.55%)		
Prolonged	2 (4.26%)	0 (0.00%)	2 (2.27%)		
Post-op Atrial Fibrillation	17 (36.17%)	11 (26.83%)	28 (31.82%)	0.35	88
Pneumonia	6 (12.77%)	5 (12.20%)	11 (12.50%)	>0.9	88
Other Infection	9 (20.45%)	3 (7.89%)	12 (14.63%)	0.11	82
Post-op Dysphagia				0.19	88
None	35 (74.47%)	36 (87.80%)	71 (80.68%)		
After arch	9 (19.15%)	5 (12.20%)	14 (15.91%)		
Post-op Hoarseness				0.82	88
None	44 (93.62%)	38 (92.68%)	82 (93.18%)		
After arch	2 (4.26%)	3 (7.32%)	5 (5.68%)		
Return to OR				0.44	87
Bleeding	3 (6.38%)	2 (5.00%)	5 (5.75%)		
Delayed chest closure	4 (8.51%)	0 (0.00%)	4 (4.60%)		
Both	2 (4.26%)	1 (2.50%)	3 (3.45%)		
Other	4 (8.51%)	4 (10.00%)	8 (9.20%)		
None	34 (72.34%)	33 (82.50%)	67 (77.01%)		
Mechanical circulatory support	7 (14.89%)	2 (5.00%)	9 (10.34%)	0.17	87
Intensive Care Unit Days	4.00 (3.00,13.00)	3.00 (3.00,6.00)	4.00 (3.00,8.00)	0.16	88
Hospital Length of Stay	14.00 (7.00,24.00)	10.00 (8.00,15.00)	12.00 (8.00,19.50)	0.19	88
30-day Re-admit	2 (4.26%)	4 (9.76%)	6 (6.82%)	0.41	88
30-day Mortality	7 (14.89%)	5 (12.20%)	12 (13.64%)	0.71	88

Table 2: Perioperative outcomes between combined root/hemiarch cohort (Root/hemi) vs. root/extensive arch cohort (Root/Arch). N= number available for each category for analysis. CVA-cerebral vascular accident

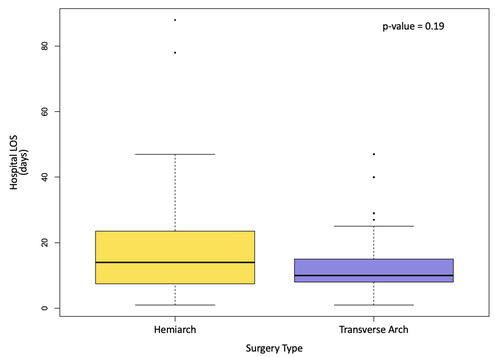


Figure 1A: Median post-operative hospital length of stay (LOS) between root/hemi-arch (hemiarch) and root/extensive arch (transverse arch) cohort

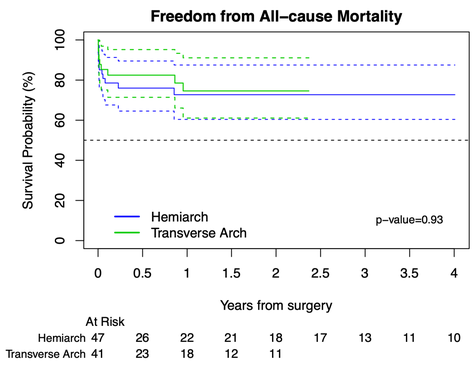


Figure 1B: Freedom from all cause mortality between root/hemi-arch (hemiarch) and root/extensive arch (transverse arch) cohort

DISCUSSION

Findings

- Root/extensive arch group demonstrated longer cardiopulmonary bypass time (261 vs 221 minutes, p=0.002), cross clamp time (210 vs 166 minutes, p<0.001), deep hypothermic circulatory arrest time (42 vs 23 minutes, p<0.001), and greater use of antegrade cerebral perfusion vs retrograde (97.56% vs 44.68%, p<0.001) compared to root-hemiarch cohort.
- Though not statistically significant, the root/extensive-arch cohort demonstrated fewer median ICU and hospital days.
- No significant difference in incidence of prolonged (>24 hrs post-op) ventilator time (34.04% vs 26.83%, p=0.46), rates of permanent cerebral vascular accident (CVA) (25.53% vs 19.51%, p=0.50), or 30-day mortality (14.89% vs 12.20%, p=0.71) between cohorts.
- No difference in freedom from all cause mortality between cohorts (p=0.93).

Limitations

Limited by a single center patient population from the UW Medical Center and a short follow-up time (2 months to 6 years). Further study should be conducted for longer post-operative outcomes and may consider multi-institution analysis.

CONCLUSIONS

At large academic aortic centers in select patients, combined root and extensive arch replacement can be performed with similar short and medium-term outcomes as root- hemiarch replacement in acute and subacute TAAD.

REFERENCES

Graphics Created in https://BioRender.com

Plain Language Summary

Type A Aortic Dissection (ATAAD) is a surgical emergency that involves a tear in the wall of the aorta that can dissect and impede blood flow to other structures. There has been concern that repairing both the aortic root and the aortic arch in the same surgery is too high risk in ATAAD patients. We demonstrated that at large aortic centers, 30-day survival, postoperative ventilator time, and incidence of stroke were similar between the standard root/hemi-arch replacement and combined root/ extensive arch replacement for acute and subacute TAAD, though the latter may offer improved outcomes and reduced need for reintervention in select patients.